

Extremophilic Amylases of Mycelial Fungi Strains Isolated in South Caucasus for Starch Processing

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Abstract : There is an increasing interest in reliable, wasteless, ecologically friendly technologies. About 40% of enzymes produced all over the world are used for production of syrups with high concentration of glucose-fructose. One of such technologies complies obtaining fermentable sugar glucose from raw materials containing starch by means of amylases. In modern alcohol-producing factories this process is running in two steps, involving two enzymes of different origin: bacterial α -amylase and fungal glucoamylase, as generally fungal amylases are less thermostable as compared to bacterial amylases. Selection of stable and operable at 70°C and higher temperatures enzyme preparation with both α - and glucoamylase activities will allow conducting this process in one step. S. Durmishidze Institute of Biochemistry and Biotechnology owns unique collection of mycelial fungi, isolated from different ecological niches of Caucasus. As a result of screening our collection 39 strains producing amylases were revealed. Most of them belong to the genus *Aspergillus*. Optimum temperatures of action of selected amylases from three producers were established to be within the range 67-80°C. *A. niger* B-6 showed higher α -amylase activity at 67°C, and glucoamylase activity at 62°C, *A. niger* 6-12 showed higher α -amylase activity at 72°C, and glucoamylase activity at 65°C, *Aspergillus niger* p8-3 showed higher activities at 82°C and 70°C, for α -amylase and glucoamylase activities, respectively. Exhaustive hydrolysis process of starch solutions of different concentrations (3, 5, 15, and 30 %) with cultural liquid and technical preparation of *Aspergillus niger* p8-3 enzyme was studied. In case of low concentrations exhaustive hydrolysis of starch lasts 40-60 minutes, in case of high concentrations hydrolysis takes longer time. 98, 6% yield of glucose can be reached at incubation during 12 hours with enzyme cultural liquid and 8 hours incubation with technical preparation of the enzyme at gradual increase of temperature from 50°C to 82°C during the first 20 minutes and further decrease of temperature to 70°C. Temperature setting for high yield of glucose and high hydrolysis (pasteurizing), optimal for activity of these strains is the prerequisite to be able to carry out hydrolysis of starch to glucose in one step, and consequently, using one strain, what will be economically justified.

Keywords : amylase, glucose hydrolysis, stability, starch

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